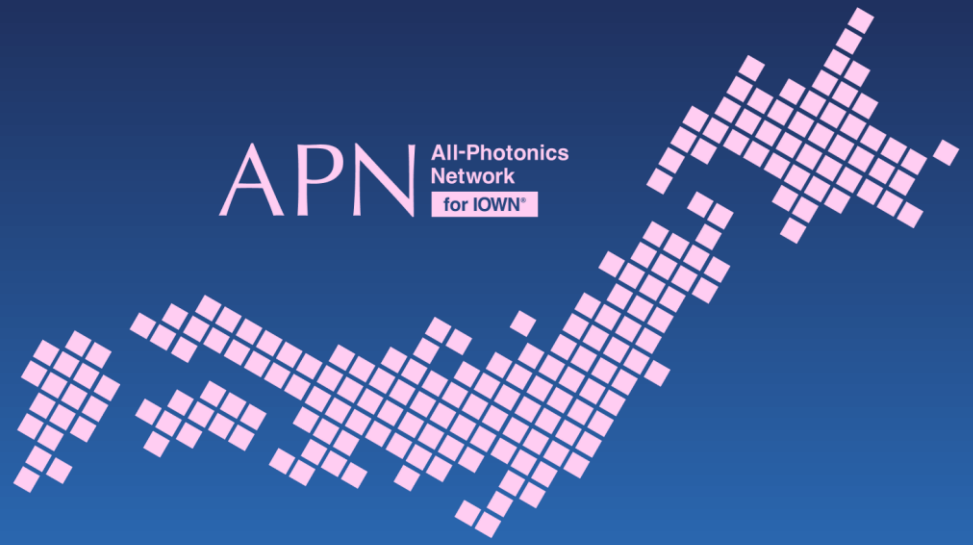


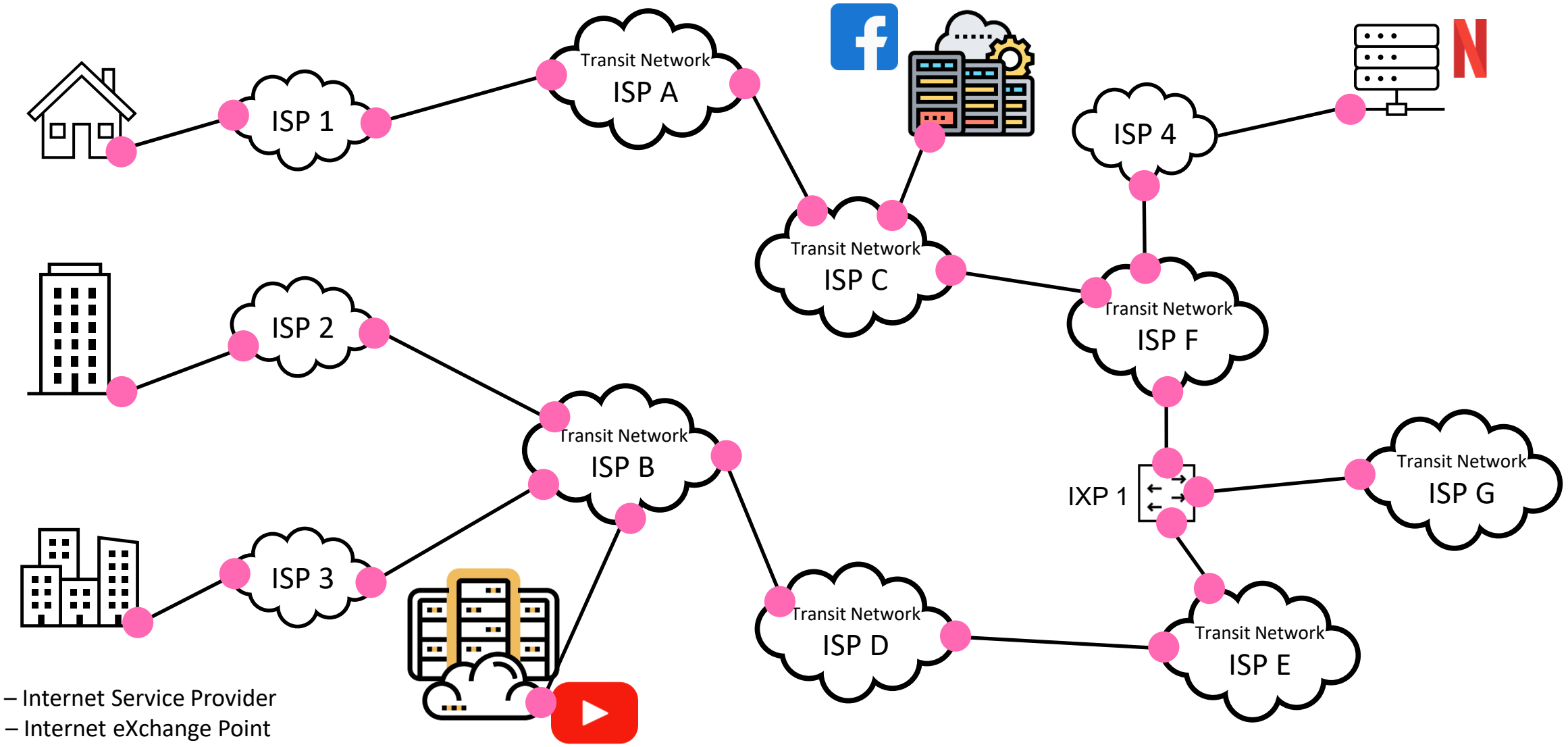
All-Photonics Network (APN)

For Innovative Optical and Wireless Network (IOWN)

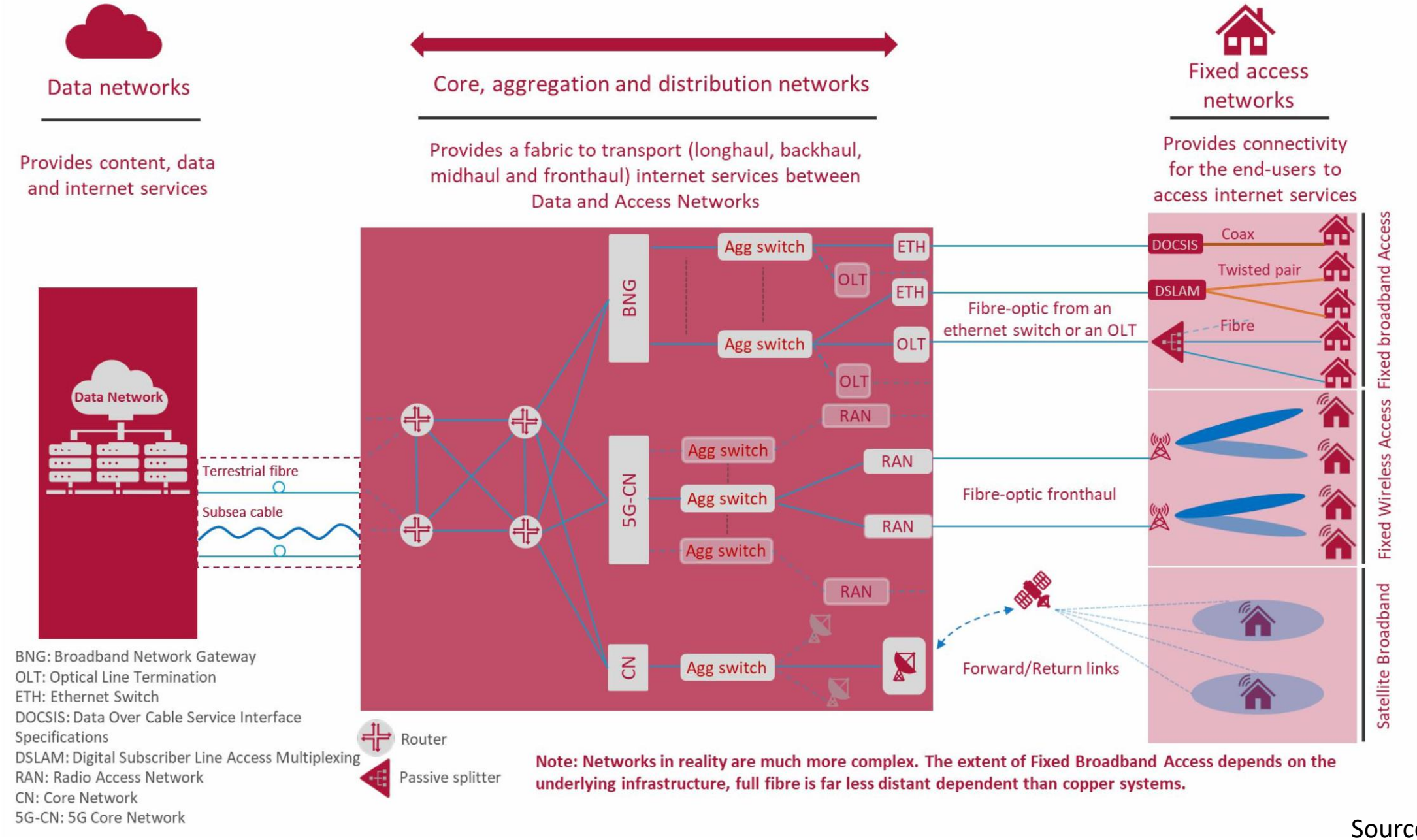
#3G4G5G

@3g4gUK

Basic Internet Layout



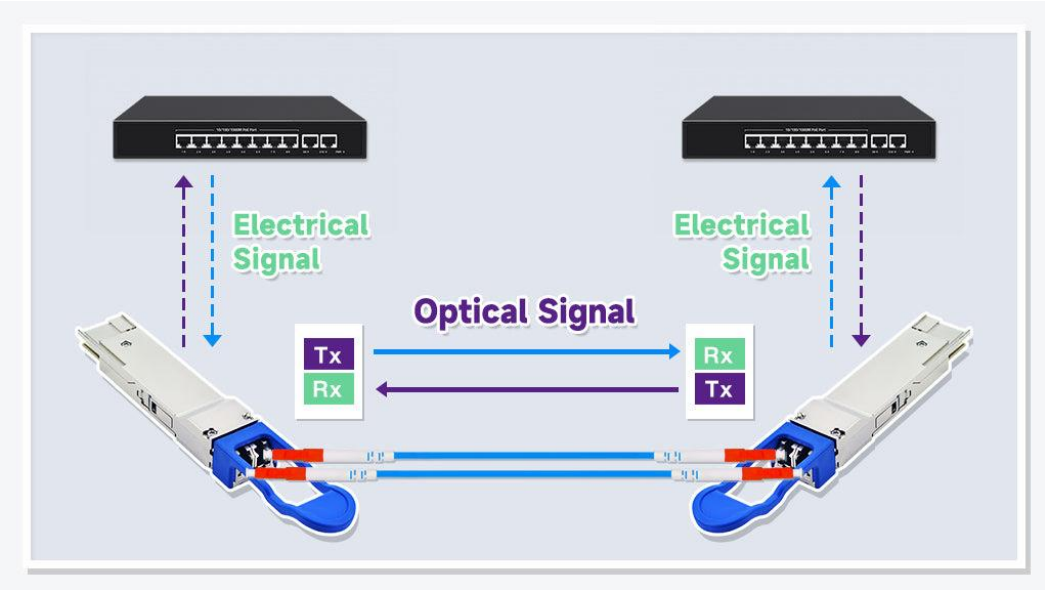
ISP – Internet Service Provider
IXP – Internet eXchange Point



Source: Ofcom

Optical-Electrical-Optical (O-E-O) Conversion

- This conversion from Optical to Electrical and Electrical to Optical gives rise to three main issues:
  - There is increase in latency during the process of conversion
  - There is wastage of power during the conversion process
  - Fibre has very high data transfer capacity, but Ethernet doesn't. The process of O-E-O places a limitation on how much data can be moved around by the network.



Picture Source: VCELINK

- These were the main reasons for creating an All-Photonic Network (APN)

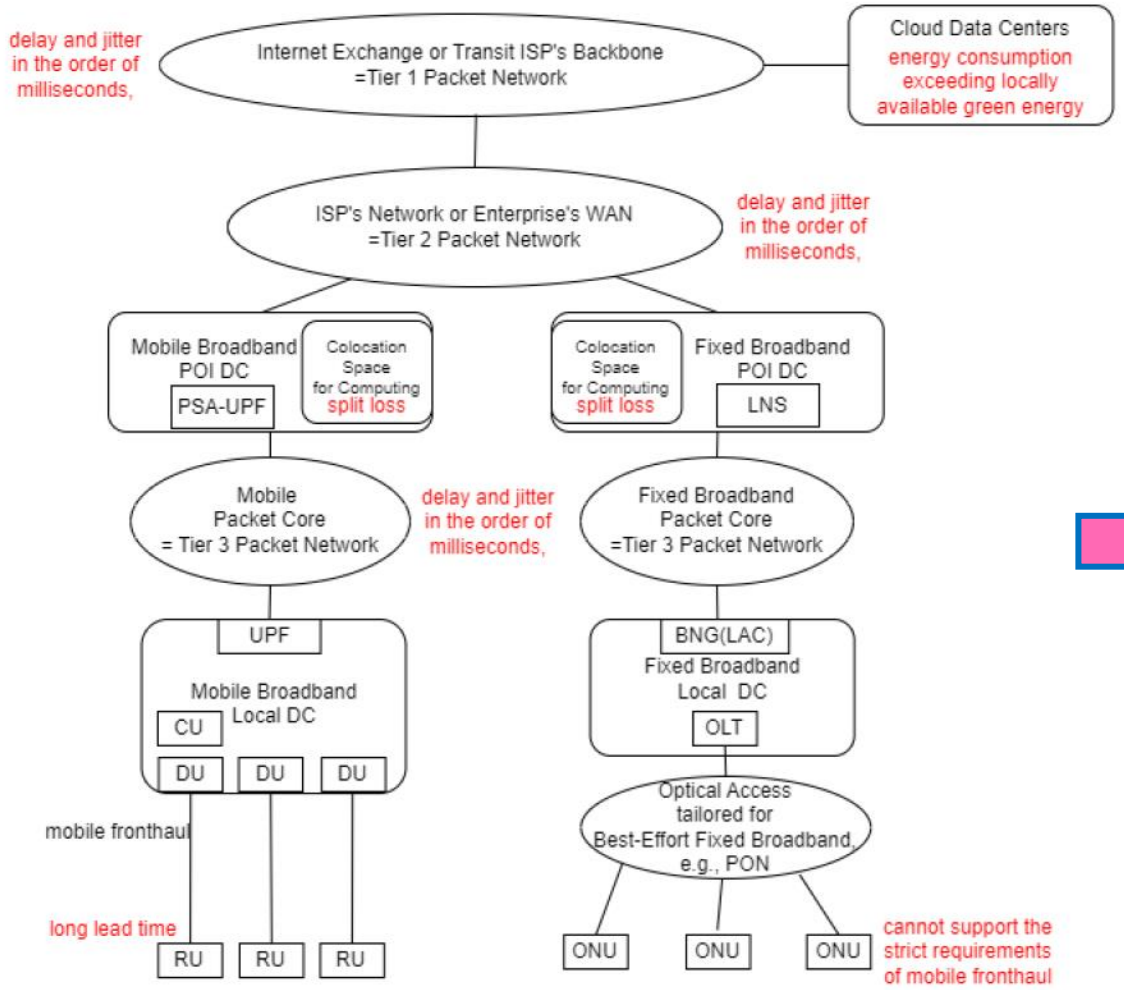


Figure 3. Today's Infrastructure

INNOVATIVE OPTICAL AND WIRELESS NETWORK GLOBAL FORUM VISION 2030

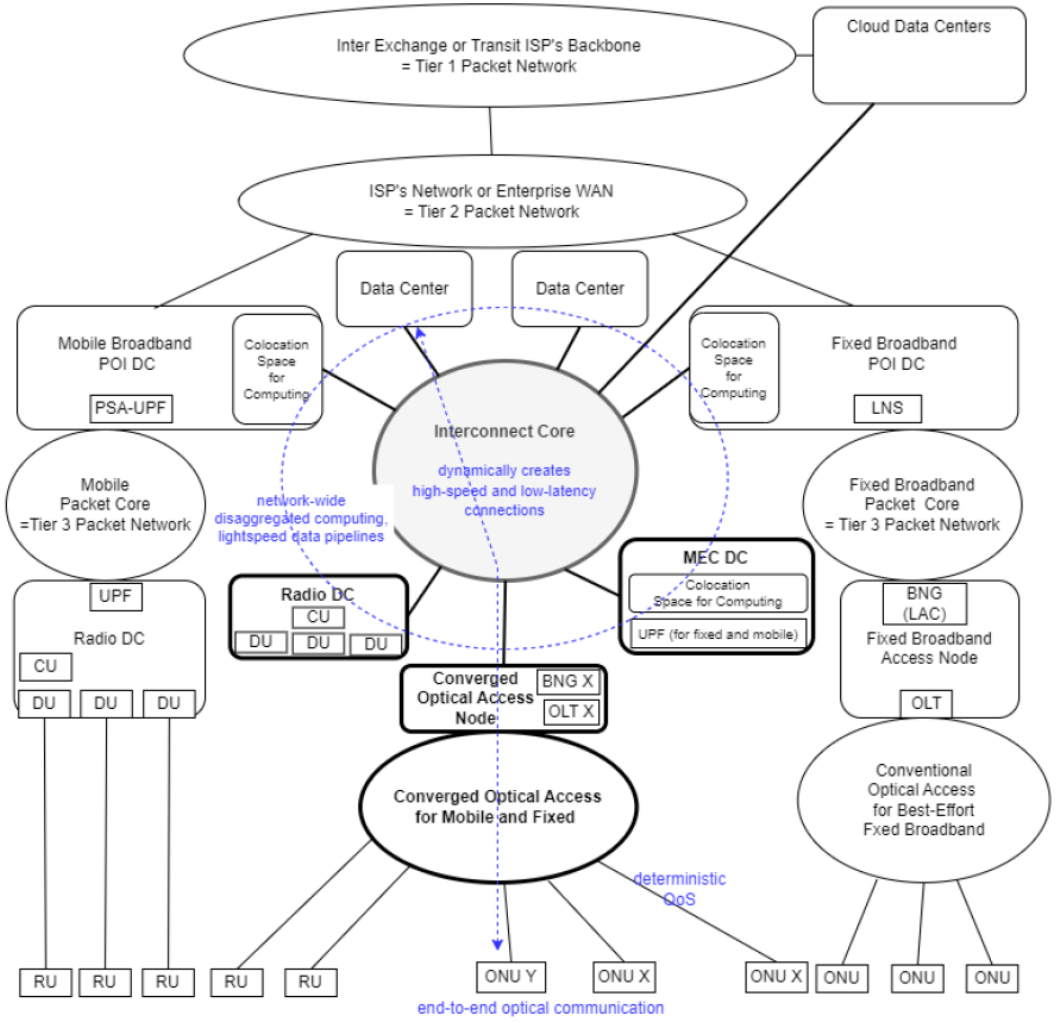
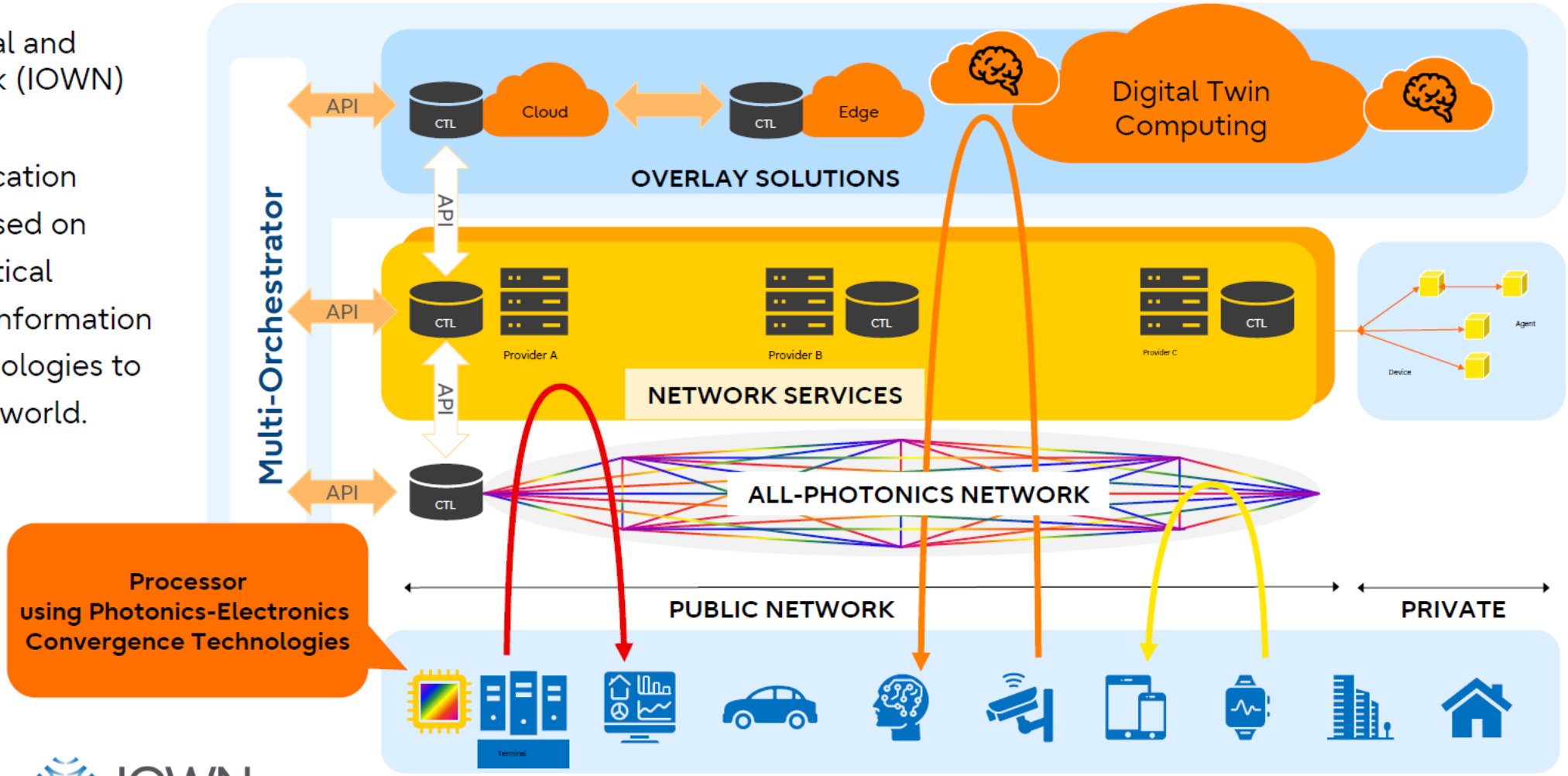


Figure 4. Evolved Infrastructure

What's IOWN?

Innovative Optical and Wireless Network (IOWN)

Future communication infrastructure based on leading-edge optical technology and information processing technologies to realize a smarter world.



Forum Activities

IOWN Global Forum will work on both technology components and use cases for enabling a smarter world

Create Specific Use Cases → Establish Technical Roadmap → Develop Technical Specifications (i.e., Architecture, Requirements) → Popularization and deployment (Cooperation with standardization organizations)

Use cases and applications

(IOWN Global Forum vision, motivating use cases, potential business impact estimations, technology requirements)


Smart Energy


Smart Cities


Smart Mobility


Smart Finance


Smart Entertainment

More Use Cases and Applications

Technical solutions

(reference architectures, protocols, interfaces, specifications)


Networking Optical & Wireless


Distributed Computing


Photonics & Optoelectronics

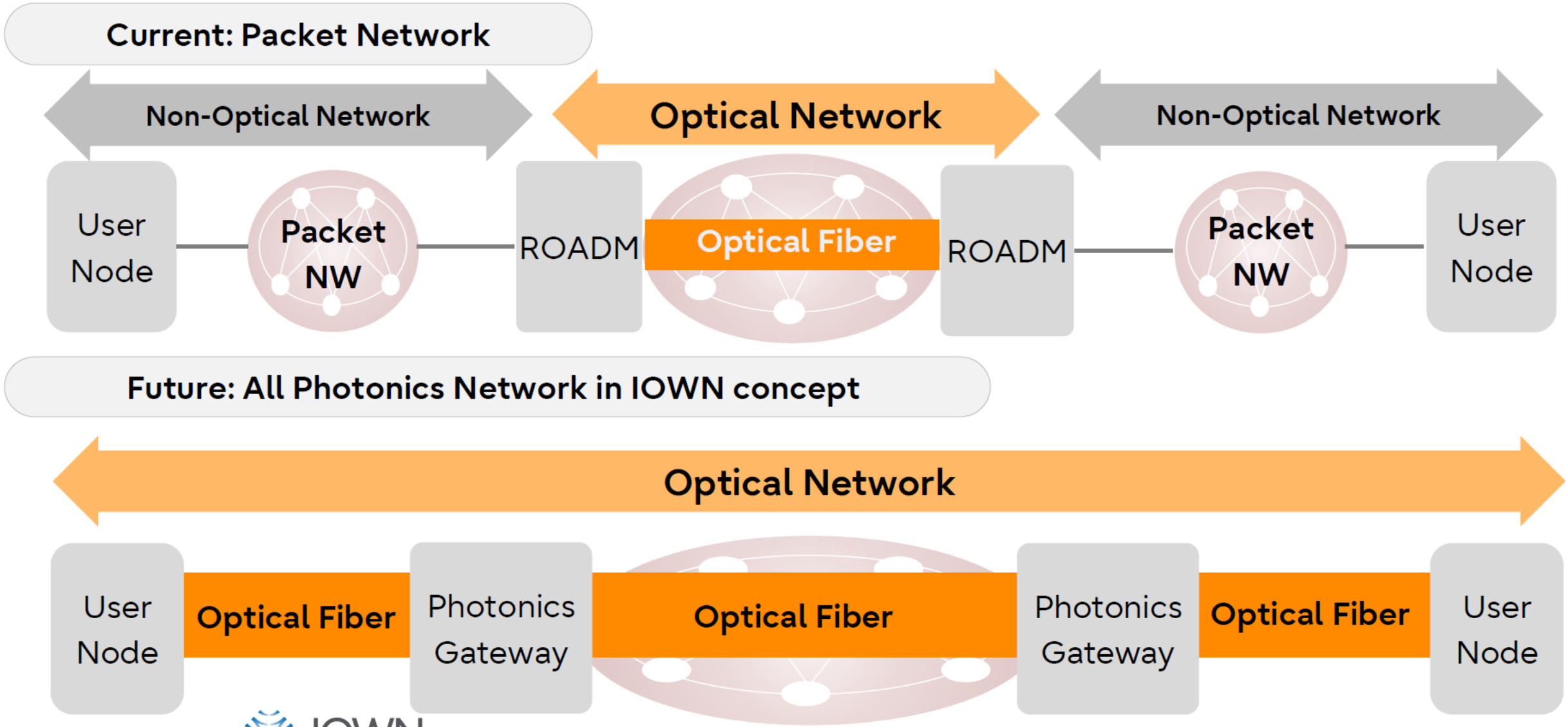

Devices, Interfaces & Terminals

More Technologies

IOWN GLOBAL FORUM

Future Image of All Photonic Network in IOWN concept

FUJITSU



IOWN

NTT's Innovative Optical and Wireless Network concept

Target performance of All-Photonics Network(APN)

Power efficiency
100 times higher

Transmission capacity
125 times higher

End-to-end delay
1/200

Key technology : Photonics-Electronics Convergence(PEC) technology

PEC devices

Prospective Use Cases leveraging IOWN

Cyber Physical Systems

Beyond Human Cognition, Prediction, Automation

Area Management

City wide surveillance
City wide autonomy

Mobility Management

Energy Aware Navigation

Industry Management

Remote Manufacturing
Inspection Automation

Health Management

Disaster outbreak prevention

Smart Grid Management

Renewable energy
Supply-demand control

NW Infrastructure Management

Maintenance automation
"Fiber-Sensing"

AI Integrated Communications

Human-Centric Application enhancing remote Communication & Operation

Entertainment

Immersive Live Music
Immersive Live Sport
Cloud Gaming

Remote Learning

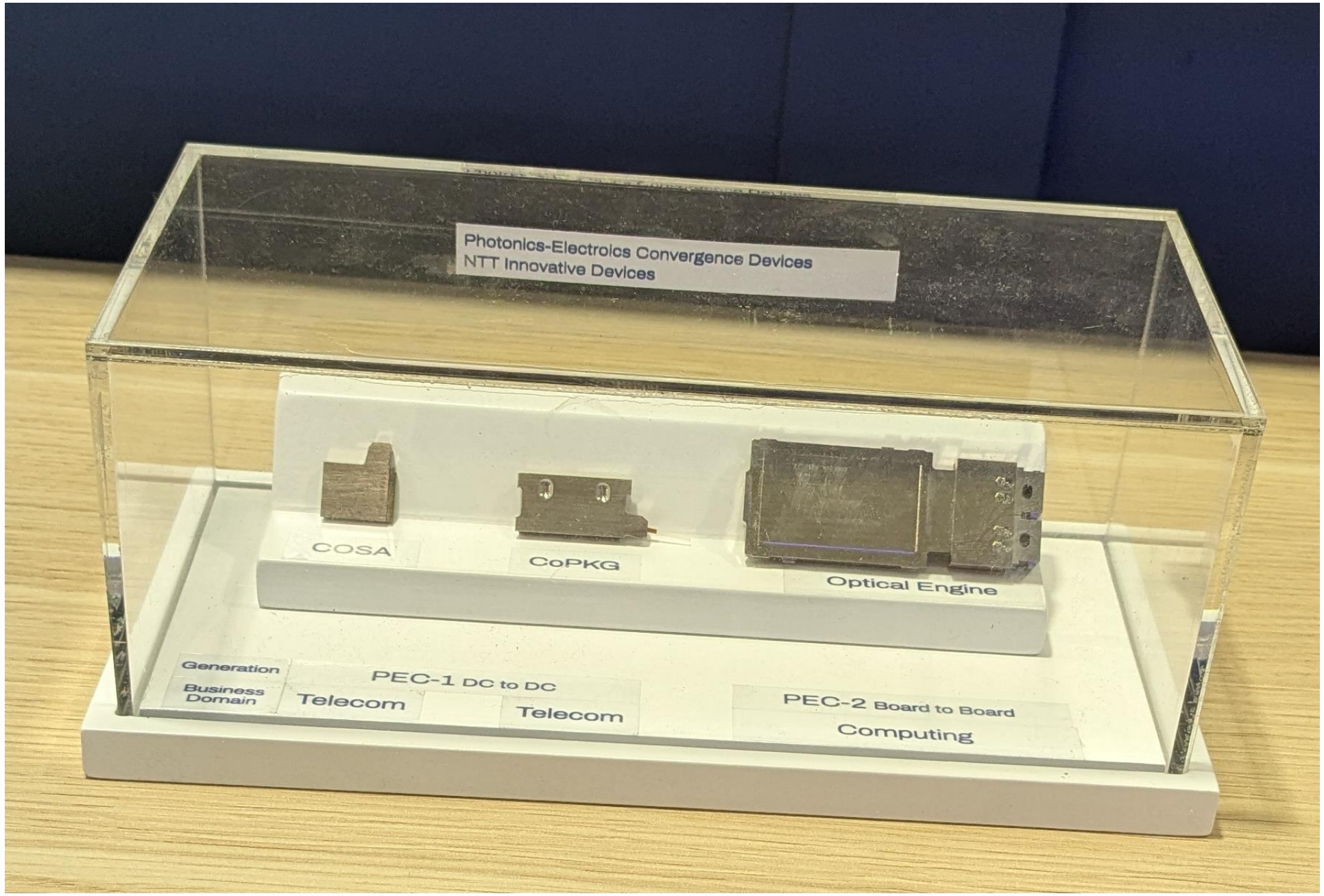
Professional Training

Navigation

Immersive XR

Human Argumentation

Enhancing smooth communication


Photonics-Electronics Convergence Devices
NTT Innovative Devices
COSA
CoPKG
Optical Engine
Generation
Business Domain
PEC-1 DC to DC
Telecom
Telecom
PEC-2 Board to Board
Computing

Open All-Photonic Network Functional Architecture

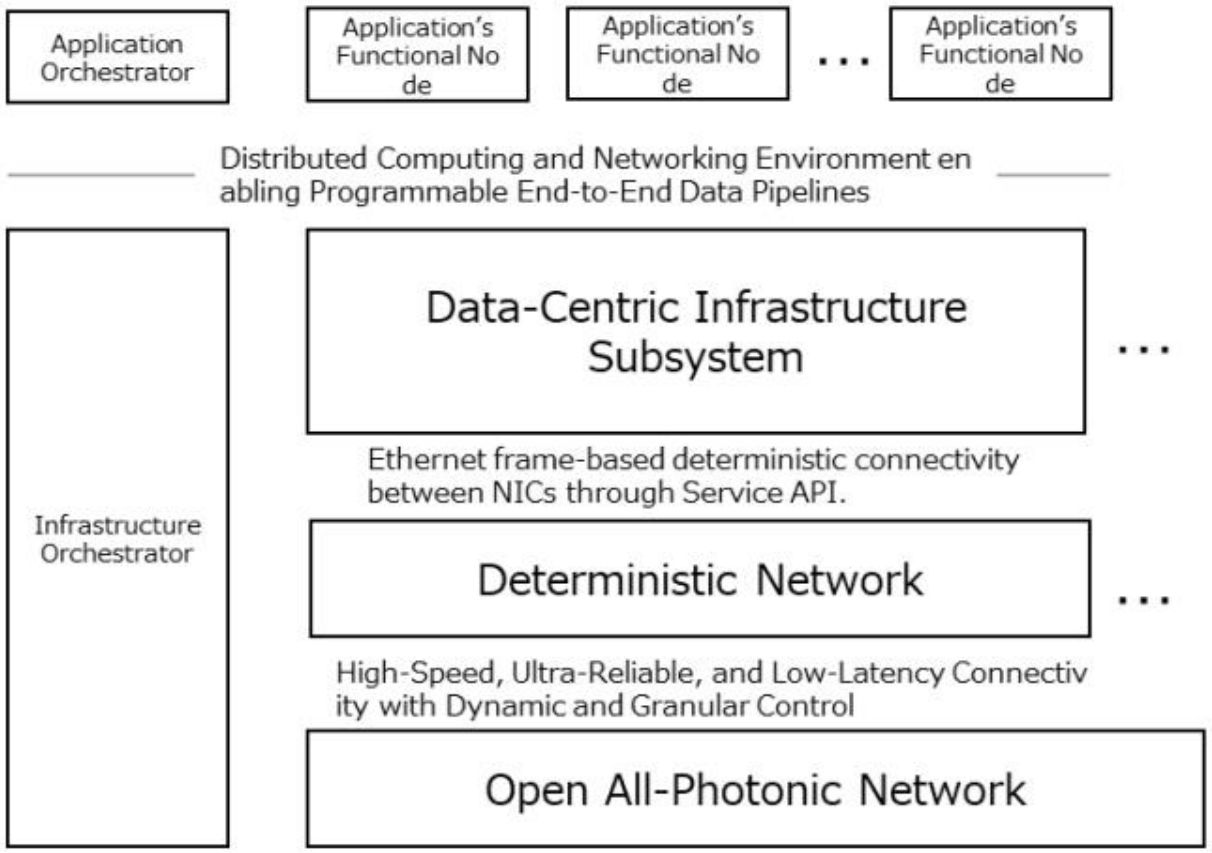


Figure 1-1 IOWN Global Forum Overall Architecture

References & Further Reading

- Omdia white paper: The All-Photonics Network Enables the Next-Generation Digital Economy, April 2025 (link)
- IOWN GF: Open All-Photonic Network Functional Architecture, June 2025 (link)
- NTT R&D: What is the All-Photonics Network? (link)
- Techzine: NTT demonstrates world's first IOWN All-Photonics Network between Japan and Taiwan, May 2025 (link)
- NTT: Successful demonstration of long-distance data center connections in the United Kingdom and the United States, April 2024 (link)
- IOWN GF Reference Document: Network Digital Twin Use Case, July 2024 (link)
- NTT PR: Successful Demonstration of Basic Technology Enabling On-Demand, Timely APN Connections from Any Location in IOWN APN, April 2025 (link)
- IOWN GF white paper: Innovative Optical And Wireless Network Global Forum Vision 2030 And Technical Directions, Feb. 2025 (link)
- NTT Docomo Presentation: IOWN Global Forum overview (link)

Thank You

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